

ABSTRACT

A regenerative fuel cell is combined with a combustion engine such as a Pulse Detonation Engine (PDE) to create a closed-loop power generation system. Stored hydrogen and oxygen are used by the regenerative fuel cell, and by the combustion engine, in which the reaction of the hydrogen and oxygen produces water in the gas phase (steam). The steam is used to generate work from a turbine shaft, which is used to drive a propulsion system for the marine vessel. After the steam passes through the turbine, the steam is cooled back to liquid water by a condenser, and stored with the water produced by the regenerative fuel cell. The stored water can be converted back into hydrogen and oxygen by using electrical power external to the closed-loop system. After regeneration of the water into hydrogen and oxygen, the closed-loop power system would be ready for operation again.